Water Quality Assessment
Uncompahgre River
Town of Olathe, Town of Olathe WWTF

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I. Water Quality Assessment Summary

Table A-1 includes summary information related to this WQA. This summary table includes key regulatory starting points used in development of the WQA such as: receiving stream information; threatened and endangered species; 303(d) and Monitoring and Evaluation listings; low flow and facility flow summaries; and a list of parameters evaluated.

As with the previous WQA, this WQA will be based on three flows tiers (Tier 1: 0.73 MGD; Tier 2: 0.49 MGD; Tier 3: 0.35 MGD) as requested by the Town of Olathe.

Table A-1
WQA Summary

Facility Information

Facility Name	Permit Number	Design Flow (max 30-day ave, MGD)	Design Flow (max 30-day ave, CFS)
Town of Olathe	CO0020907	0.73	1.1
Town of Olathe	CO0020907	0.49	0.76
Town of Olathe	CO0020907	0.35	0.54

Receiving Stream Information

Receiving Stream Name	Segment ID	Designation	Classification(s)
Uncompahgre River	COGUUN04b	Use Protected	Aquatic Life Warm 2 Recreation Class P Agriculture Water Supply

Low Flows (cfs) Additional flow information is in Section IV

Annual 1E3 (1-day)	Annual 7E3 (7-day)	Annual 30E3 (30-day)	Ratio of 30E3 to the Design Flow (cfs)
2.1	2.3	2.6	2.4:1
2.1	2.3	2.6	3.4:1
2.1	2.3	2.6	4.8:1

Regulatory Information

T&E Species	303(d) (Reg 93)	Monitor and Eval (Reg 93)	Existing TMDL	Temporary Modification(s)	Control Regulation
No	None	Sediment	Yes Selenium	Type A, Se(ch)=current conditions expires 12/31/2017	None

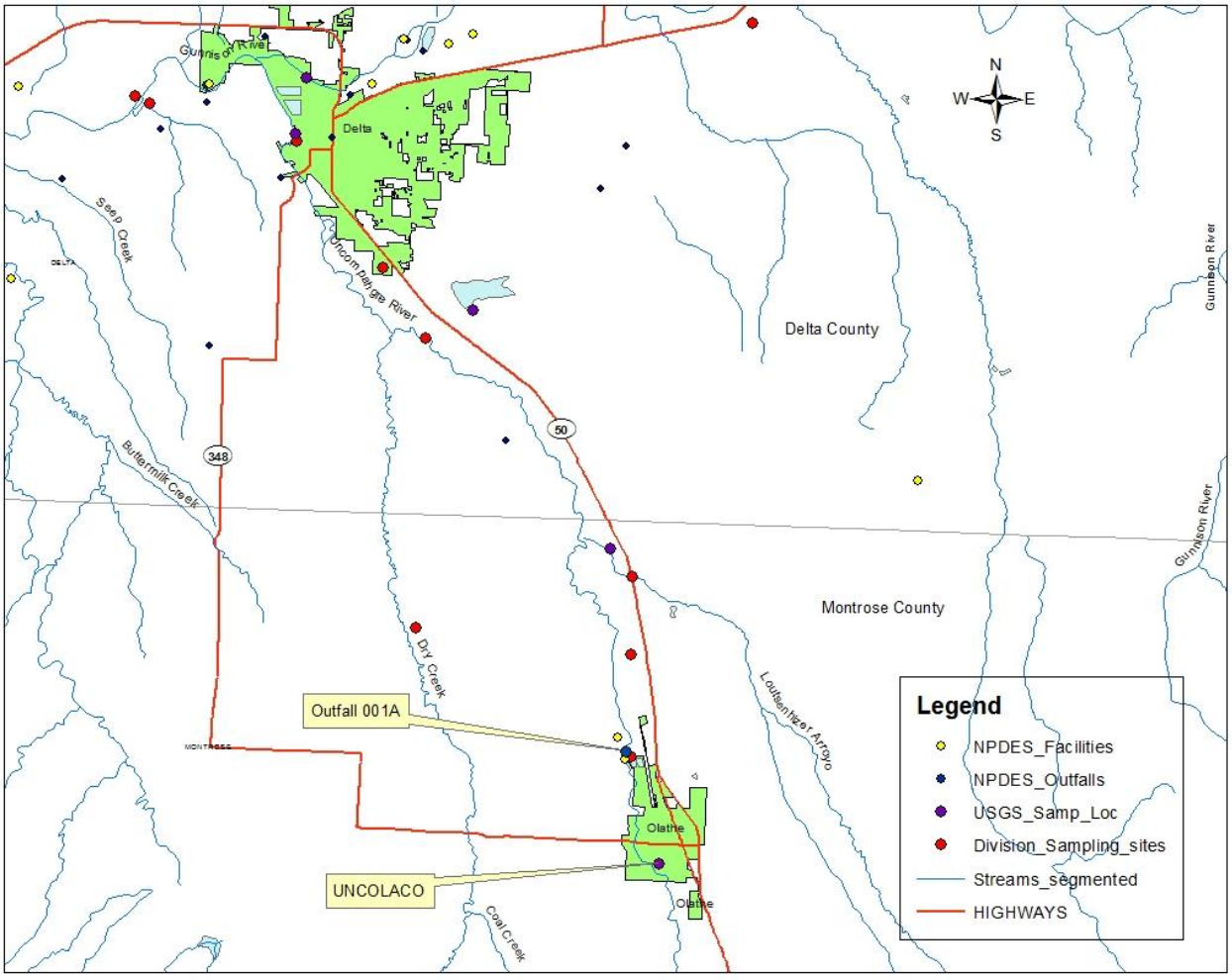
Pollutants Evaluated

Ammonia, *E. Coli*, TRC, pH, Temperature and Selenium.

II. Introduction

The water quality assessment (WQA) of Uncompahgre River near the Town of Olathe wastewater treatment facility (Olathe WWTF), located in Montrose County, is intended to determine the assimilative capacities available for pollutants found to be of concern. This WQA describes how the water quality based effluent limits (WQBELs) are developed. These parameters may or may not appear in the permit with limitations or monitoring requirements, subject to other determinations such as reasonable potential analysis, evaluation of federal effluent limitation guidelines, implementation of state-based technology based limits, mixing zone analyses, 303(d) listings, threatened and endangered species listing, or other requirements as discussed in the permit factsheet. Figure A-1 contains a map of the study area evaluated as part of this WQA.

FIGURE A-1



The Town of Olathe WWTF discharges to Uncompahgre River, which is stream segment COGUUN04b. This means the Gunnison River Basin, Uncompahgre River Sub-basin, Stream Segment 04b. This segment is composed of the "Mainstem of the Uncompahgre River from

Gunnison Road to the Upstream boundary of Confluence Park." Stream segment COGUUN04b is classified for Aquatic Life Warm 2, Recreation Class P, Water Supply and Agriculture.

Information used in this assessment includes data gathered from the Town of Olathe WWTF, the Division, the Colorado Division of Water Resources (DWR), Riverwatch, the U.S. Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS), and communications with the local water commissioner. The data used in the assessment consist of the best information available at the time of preparation of this WQA analysis.

III. Water Quality Standards

Narrative Standards

Narrative Statewide Basic Standards have been developed in Section 31.11(1) of the regulations, and apply to any pollutant of concern, even where there is no numeric standard for that pollutant. Waters of the state shall be free from substances attributable to human-caused point source or nonpoint source discharges in amounts, concentrations or combinations which:

for all surface waters except wetlands;

(i) can settle to form bottom deposits detrimental to the beneficial uses. Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludge, mine slurry or tailings, silt, or mud; or (ii) form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or (iii) produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or (iv) are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or (v) produce a predominance of undesirable aquatic life; or (vi) cause a film on the surface or produce a deposit on shorelines; and

for surface waters in wetlands;

(i) produce color, odor, changes in pH, or other conditions in such a degree as to create a nuisance or harm water quality dependent functions or impart any undesirable taste to significant edible aquatic species of the wetland; or (ii) are toxic to humans, animals, plants, or aquatic life of the wetland.

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for any parameter of concern could be put in CDPS discharge permits.

Standards for Organic Parameters and Radionuclides

Radionuclides: Statewide Basic Standards have been developed in Section 31.11(2) and (3) of The Basic Standards and Methodologies for Surface Water to protect the waters of the state from radionuclides and organic chemicals.

In no case shall radioactive materials in surface waters be increased by any cause attributable to municipal, industrial, or agricultural practices or discharges to as to exceed the following levels,

unless alternative site-specific standards have been adopted. Standards for radionuclides are shown in Table A-2.

Table A-2
Radionuclide Standards

Parameter	Picocuries per Liter
Americium 241*	0.15
Cesium 134	80
Plutonium 239, and 240*	0.15
Radium 226 and 228*	5
Strontium 90*	8
Thorium 230 and 232*	60
Tritium	20,000

*Radionuclide samples for these materials should be analyzed using unfiltered (total) samples. These Human Health based standards are 30-day average values for both plutonium and americium.

Organics: The organic pollutant standards contained in the Basic Standards for Organic Chemicals Table are applicable to all surface waters of the state for the corresponding use classifications, unless alternative site-specific standards have been adopted. These standards have been adopted as "interim standards" and will remain in effect until alternative permanent standards are adopted by the Commission. These interim standards shall not be considered final or permanent standards subject to antibacksliding or downgrading restrictions. Although not reproduced in this WQA, the specific standards for organic chemicals can be found in Regulation 31.11(3).

In order to protect the Basic Standards in waters of the state, effluent limitations and/or monitoring requirements for radionuclides, organics, or any other parameter of concern could be put in CDPS discharge permits.

The aquatic life standards for organics apply to all stream segments that are classified for aquatic life. The water supply standards apply only to those segments that are classified for water supply. The water + fish standards apply to those segments that have a Class 1 aquatic life and a water supply classification. The fish ingestion standards apply to Class 1 aquatic life segments that do not have a water supply designation. The water + fish and the fish ingestion standards may also apply to Class 2 aquatic life segments, where the Water Quality Control Commission has made such determination.

Because the Uncompahgre River is classified for Aquatic Life Warm 2, with a water supply designation the water supply and aquatic life standards apply to this discharge.

Salinity

Regulation 61.8(2)(l) contains requirements regarding salinity for any discharges to the Colorado River Watershed. For industrial dischargers and for the discharge of intercepted groundwater, this is a no-salt discharge requirement. However, the regulation states that this requirement may be waived

where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 350 tons per year. The Division may permit the discharge of salt upon a satisfactory demonstration that it is not practicable to prevent the discharge of all salt. See Regulation 61.8(2)(l)(i)(A)(1) for industrial discharges and 61.8(2)(l)(iii) for discharges of intercepted groundwater for more information regarding this demonstration.

For municipal dischargers, an incremental increase of 400 mg/l above the flow weighted averaged salinity of the intake water supply is allowed. This may be waived where the salt load reaching the mainstem of the Colorado River is less than 1 ton per day, or less than 366 tons per year. The Division may permit the discharge of salt in excess of the 400 mg/l incremental increase, upon a satisfactory demonstration that it is not practicable to attain this limit. See Regulation 61.8(2)(l)(vi)(A)(1) for more information regarding this demonstration.

In addition, the Division's policy, Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, may be applied to discharges where an agricultural water intake exists downstream of a discharge point. Limitations for electrical conductivity and sodium absorption ratio may be applied in accordance with this policy.

Temperature

Temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to the resident aquatic life. This standard shall not be interpreted or applied in a manner inconsistent with section 25-8-104, C.R.S.

Segment Specific Numeric Standards

Numeric standards are developed on a basin-specific basis and are adopted for particular stream segments by the Water Quality Control Commission. The standards in Table A-3 have been assigned to stream segment COGUUN04b in accordance with the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins.*

The Water Quality Control Commission has recently completed a preliminary final action concerning the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins*. The preliminary final action modifies the classifications for this segment to include the water supply standards and a change of recreation classification from Class N (not primary contact use) to Class P (potential primary contact use). The proposed changes are not expected to impact this discharge with the exception of standards for temperature, and a more stringent *E. Coli* standard, specified in Table A-3 and discussed in Section VI of the WQA.

An amendment to the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins* that becomes effective on March 30, 2013, will change the applicable standards for stream segment COGUUN04b. This WQA has been developed in conformance with the water quality standards that will become effective on March 30, 2013, as any permitting action based on this WQA would take effect immediately after (or just prior to) the effective date of this regulation.

The temporary modification for selenium (chronic) with expiration date of 03/31/2013 has been

changed from 20 µg/l, to temporary modification Type A, equal to current condition, with expiration date of 12/31/2017. All water supply standards have been included. Nitrate (acute) has changed from 100 mg/l to 10 mg/l. Total recoverable arsenic (chronic) has changed from 1000 µg/l to 0.02 µg/l. Total recoverable iron (chronic) is now 1800 µg/l, changed from 2250 µg/l. *E. coli* has been changed from 630 colonies/100ml to 205 colonies/100ml. Standards for temperature, dissolved trivalent chromium (chronic) and total recoverable molybdenum (chronic) have been included in this segment. Standard for dissolved trivalent chromium (acute) has been removed.

Table A-3

In-stream Standards for Stream Segment COGUUN04b

Physical and Biological
Dissolved Oxygen (DO) = 5 mg/l, minimum
pH = 6.5 - 9 su
E. coli chronic = 205 colonies/100 ml
Temperature March-Nov = 27.5° C MWAT and 28.6° C DM
Temperature Dec-Feb = 13.8° C MWAT and 14.3° C DM
Inorganic
Total Ammonia acute and chronic = TVS
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 0.05 mg/l
Nitrate acute = 10 mg/l
Chloride chronic = 250 mg/l
Sulfate chronic = For WS, the greater of ambient water quality as of January 1, 2000 or 250 mg/l
Metals
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 0.02 µg/l
Dissolved Cadmium acute and chronic = TVS
Total Recoverable Trivalent Chromium acute = 50 µg/l
Dissolved Trivalent Chromium chronic = TVS
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Dissolved Iron chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 300 µg/l
Total Recoverable Iron chronic = 1800 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese chronic = For WS, the greater of ambient water quality as of January 1, 2000, or 50 µg/l
Dissolved Manganese acute and chronic = TVS
Total Recoverable Molybdenum chronic = 160 µg/l
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute and chronic = TVS
Temporary Modification Type A, dissolved Selenium chronic = Current Condition. Expires 12/31/2017
Dissolved Silver acute and chronic = TVS
Dissolved Zinc acute and chronic = TVS

Statewide standards for total recoverable aluminum (acute/chronic) and nonylphenol (acute/chronic) may also be applied to this stream segment.

Table Value Standards and Hardness Calculations

As metals with standards specified as TVS are not included as parameters of concern for this facility, the hardness value of the receiving water and the subsequent calculation of the TVS equations is inconsequential and is therefore omitted from this WQA.

Total Maximum Daily Loads and Regulation 93 – Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List

This stream segment is listed for monitoring and evaluation for Sediment. According to Division standard procedure, the Division's Environmental Data Unit investigates issues of water quality standard exceedances. If it is determined that the water body is impaired, the segment will be added to the 303(d) list. At a minimum, the permit may contain monitoring requirements to support a future TMDL if the segment is listed.

The Division's Restoration and Protection Unit have completed the TMDL for selenium; therefore the requirements of the TMDL apply for selenium. The WLAs in the TMDL were combined for the Town of Olathe WWTF, the Montrose WWTF and the West Montrose SD WWTF as 0.361 lbs/day for chronic selenium. The WLA separated for individual facilities in internal Division document as shown in Table A-4a.

Table A-4a
TMDL Waste Load Allocations for Selenium

Facility	WLA (lbs/day)
Town of Olathe WWTF (for 2nd tier design flow of 0.49 MGD (0.76 cfs))	**0.021**
West Montrose SD WWTF	**0.048**
City of Montrose WWTF	**0.29**

There is a temporary modification for chronic selenium with expiration date of 12/31/2017. The TMDL will be implemented after the temporary modification expires. The WLA for the Town of Olathe was based on the second tier flow of 0.49 MGD, giving a concentration of 5.1 µg/l. The WLA for the 1st and 3rd flow tier have been calculated using the 5.1 ug/l concentration and the formula below.

Load (lb/day) = flow (MGD) X Conc (mg/l) X 8.34

The resulting loading is presented in Table A-4b.

Table A-4b TMDL Waste Load Allocations for Se for Olathe WWTF	
Facility	**WLA (lbs/day)**
Design flow of 0.73 MGD	**0.031**
Design flow of 0.49 MGD	**0.021**
Design flow of 0.35 MGD	**0.015**

IV. Receiving Stream Information

Low Flow Analysis

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval, and is used in developing limitations based on an acute standard. The 7-day average low flow, 7E3, represents the seven-day average low flow recurring in a 3 year interval, and is used in developing limitations based on a Maximum Weekly Average Temperature standard (MWAT). The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval, and is used in developing limitations based on a chronic standard.

To determine the low flows available to the Town of Olathe WWTF, gauge station identified as UNCOLACO (Uncompahgre River near Olathe, CO) was used. This gauge station is approximately two miles upstream of the Olathe WWTF. This flow gauge provides a representative measurement of the upstream flow because there are no diversions or confluence of significance between the flow gauge and the facility. The period of record was from January 2000 through September 2011.

Daily flows from gauge station UNCOLACO (Uncompahgre River near Olathe, CO) were obtained and the annual 1E3, 7E3 and 30E3 low flows were calculated using U.S. Environmental Protection Agency (EPA) DFLOW software. The output from DFLOW provides calculated acute and chronic low flows for each month.

Based on the low flow analysis, the upstream low flows available to the Town of Olathe WWTF were calculated and are presented in Table A-5a.

Table A-5a Low Flows for Uncompahgre River at the UNCOLACO Gauge													
Low Flow (cfs)	***Annual***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
1E3 Acute	0.10	86	51	0.6	0.1	0.6	0.5	0.3	0.3	0.4	0.4	1.5	94
7E3 Chronic	0.30	88	51	0.6	0.3	0.6	0.4	0.4	0.4	0.7	0.4	1.5	94
30E3 Chronic	0.60	89	51	0.6	0.6	0.6	0.6	0.6	0.6	1.3	1.3	1.5	94

During the months of February, March, November and December, the acute low flow calculated by DFLOW exceeded the chronic low flow. In accordance with Division standard procedures, the acute low flow was thus set equal to the chronic low flow for these months.

The Town of Olathe installed a flow gauge immediately above their discharge to record the low flow available to the facility and potential return flow since the water users tend to drain the river just upstream of the UNCOLACO gauge station during the summer months. The Town's gauge was not properly maintained, therefore, recorded flow could not be used. Based on the water commissioner's assessment of the returned flow after the UNCOLACO flow gauge, the Division decided to increase the low flow for the months of March through November by 2cfs and include a special condition in the permit for the Town of Olathe to correctly install and calibrate their flow gauge to verify the flow increases and have actual flow measurement for use in the next permit. The 2 cfs flow increases for the months of March though November is show in Table A-5b.

Table A-5b

Low Flows for Uncompahgre River at the Town of Olathe WWTF with 2cfs added to the Months of March though November

Low Flow (cfs)	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
1E3 Acute	2.1	86	51	2.6	2.1	2.6	2.5	2.3	2.3	2.4	2.4	3.5	94
7E3 Chronic	2.3	88	51	2.6	2.3	2.6	2.4	2.4	2.4	2.7	2.4	3.5	94
30E3 Chronic	2.6	89	51	2.6	2.6	2.6	2.6	2.6	2.6	3.3	3.3	3.5	94

The ratio of the low flow of Uncompahgre River to the Town of Olathe WWTF 0.73 MGD design flow is 2.4:1.
The ratio of the low flow of Uncompahgre River to the Town of Olathe WWTF at the 0.49 MGD flow tier is 3.4:1.
The ratio of the low flow of Uncompahgre River to the Town of Olathe WWTF at the 0.35 MGD flow tier is 4.8:1.

Mixing Zones

The amount of the available assimilative capacity (dilution) that may be used by the permittee for the purposes of calculating the WQBELs may be limited in a permitting action based upon a mixing zone analysis or other factor. These other factors that may reduce the amount of assimilative capacity available in a permit are: presence of other dischargers in the vicinity; the presence of a water diversion downstream of the discharge (in the mixing zone); the need to provide a zone of passage for aquatic life; the likelihood of bioaccumulation of toxins in fish or wildlife; habitat considerations such as fish spawning or nursery areas; the presence of threatened and endangered species; potential for human exposure through drinking water or recreation; the possibility that

aquatic life will be attracted to the effluent plume; the potential for adverse effects on groundwater; and the toxicity or persistence of the substance discharged.

Unless a facility has performed a mixing zone study during the course of the previous permit, and a decision has been made regarding the amount of the assimilative capacity that can be used by the facility, the Division assumes that the full assimilative capacity can be allocated. Note that the review of mixing study considerations, exemptions and perhaps performing a new mixing study (due to changes in low flow, change in facility design flow, channel geomorphology or other reason) is evaluated in every permit and permit renewal.

If a mixing zone study has been performed and a decision regarding the amount of available assimilative capacity has been made, the Division may calculate the water quality based effluent limitations (WQBELs) based on this available capacity. In addition, the amount of assimilative capacity may be reduced by T&E implications.

For this facility, 100% of the available assimilative capacity may be used as the facility has not performed a mixing zone study, the discharge is not to a T&E stream segment, and is not expected to have an influence on any of the other factors listed above.

Ambient Water Quality

The Division evaluates ambient water quality based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 31*, and as outlined in the Division's Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits (WQP-19). Ambient water quality is evaluated in this WQA analysis for use in determining assimilative capacities and in completing antidegradation reviews for pollutants of concern, where applicable.

To conduct an assessment of the ambient water quality upstream of the Town of Olathe WWTF, pH and temperature data were collected by the Town of Olathe, upstream of the discharge from a period of record (POR) from 01/23/2006 through 11/25/2009.Selenium, Nitrate plus Nitrite, and Ammonia data were available at Riverwatch station 159 (Uncompahgre River at La Salle Rd), located approximately 11 miles upstream of the discharge with a POR of 11/13/2007 through 04/19/2012. Data from these sources were used to reflect upstream water quality. These data are summarized in Table A-6.

Table A-6

Ambient Water Quality for Uncompahgre River

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Maximum*	*Chronic Stream Standard*	*Notes*
Temp (°C)	177	4.3	9.7	16	9.9	19	NA	
pH (su)	177	8	8.2	8.3	8.1	8.7	6.5-9	
Nitrate+Nitrite as N (mg/l)	50	0.074	0.16	0.38	0.25	1.8	NA	
NH_3 as N, Tot (mg/l)	51	0	0	0.02	0.013	0.25	TVS	1
Se, Dis (µg/l)	58	0	0	0	0.75	36	4.6	1

Note 1: When sample results were below detection levels, the value of zero was used in accordance with the Division's standard approach for summarization and averaging purposes.

V. Facility Information and Pollutants Evaluated

Facility Information

The Town of Olathe WWTF is located at in the S1/2, SE4, S4, TS05, R10W; 5049 North River Road in Olathe, CO; 38° 37' 18" latitude North and 107° 59' 31" longitude West in Montrose County. The current design capacity of the facility is 0.73 MGD (1.1 cfs). Wastewater treatment is accomplished using aerated lagoons. The technical analyses that follow include assessments of the assimilative capacity based on this design capacity.

An assessment of Division records indicate that there are two additional facilities with individual permit discharging to the same stream segment or other stream segments immediately upstream or downstream from this facility. Other facilities discharging to the same stream segment or other stream segments immediately upstream or downstream from this facility are covered by general permits and have limitations set at the water quality standards. These facilities were not modeled in this WQA as they have a minimal impact on the ambient water quality. The nearest dischargers are:

- West Montrose Sanitation District WWTF (CO0030449), which discharges to stream segment COGUUN04a, approximately 10 miles upstream of the Town of Olathe WWTF.
- City of Montrose WWTF (CO0039624), which discharges to stream segment COGUUN04a, about 10 miles upstream of the Town of Olathe WWTF.

Due to the distance between facilities, and the ambient water quality background concentrations used in the mass-balance equation (as described in the following section) account for pollutants of concern contributed by upstream sources, therefore it was not necessary to model upstream dischargers together with the Town of Olathe WWTF when determining the available assimilative capacities in this area of the Uncompahgre River.

Pollutants of Concern

Pollutants of concern may be determined by one or more of the following: facility type; effluent characteristics and chemistry; effluent water quality data; receiving water quality; presence of federal effluent limitation guidelines; or other information. Parameters evaluated in this WQA may or may not appear in a permit with limitations or monitoring requirements, subject to other determinations such as a reasonable potential analysis, mixing zone analyses, 303(d) listings, threatened and endangered species listings or other requirement as discussed in a permit rationale.

There are no site-specific in-stream water quality standards for BOD_5 or $CBOD_5$, TSS, percent removal, and oil and grease for this receiving stream. Thus, assimilative capacities were not determined for these parameters. The applicable limitations for these pollutants can be found in Regulation No. 62 and will be applied in the permit for the WWTF.

The following parameters were identified by the Division as pollutants to be evaluated for this facility:

- Total Residual Chlorine
- *E. coli*
- Ammonia
- Temperature
- pH
- Selenium (due to TMDL)

Based upon the size of the discharge, the lack of industrial contributors, dilution provided by the receiving stream and the fact that no unusually high metals concentrations are expected to be found in the wastewater effluent, metals are not evaluated further in this water quality assessment.

According to the *Rationale for Classifications, Standards and Designations of the Gunnison River*, stream segment COGUUN04b is designated a water supply because there are two alluvial wells located in the segment. Since the wells are located upstream of the discharge, the nitrate standard, which is applied at the point of intake to a water supply, is not evaluated as part of this analysis.

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were identified as pollutants of concern.

VI. Determination of Water Quality Based Effluent Limitations (WQBELs)

Technical Information

Note that the WQBELs developed in the following paragraphs, are calculations of what an effluent limitation may be in a permit. The WQBELs for any given parameter will be compared to other potential limitations (Federal Effluent Limitations Guidelines, State Effluent Limitations, or other applicable limitation) and typically the more stringent limit is incorporated into a permit. If the WQBEL is the more stringent limitation, incorporation into a permit is dependent upon a reasonable potential analysis.

In-stream background data and low flows evaluated in Sections II and III are used to determine the assimilative capacity of Uncompahgre River near the Town of Olathe WWTF for pollutants of concern, and to calculate the WQBELs. For all parameters except ammonia, it is the Division's approach to calculate the WQBELs using the lowest of the monthly low flows (referred to as the annual low flow) as determined in the low flow analysis. For ammonia, it is the standard procedure of the Division to determine monthly WQBELs using the monthly low flows, as the regulations allow the use of seasonal flows.

The Division's standard analysis consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used by the Division to calculate the WQBELs, and accounts for the upstream concentration of a pollutant at the existing quality, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = In-stream background pollutant concentrations at the existing quality
M_2 = Calculated WQBEL
M_3 = Water Quality Standard, or other maximum allowable pollutant concentration

The upstream background pollutant concentrations used in the mass-balance equation will vary based on the regulatory definition of existing ambient water quality. For most pollutants, existing quality is determined to be the 85th percentile. For metals in the total or total recoverable form, existing quality is determined to be the 50th percentile. For pathogens such as fecal coliform and *E. coli*, existing quality is determined to be the geometric mean.

For temperature, the highest 7-day mean (for the chronic standard) of daily average stream temperature, over a seven consecutive day period will be used in calculations of the chronic temperature assimilative capacity, where the daily average temperature should be calculated from a minimum of three measurements spaced equally through the day. The highest 2-hour mean (for the acute standard) of stream temperature will be used in calculations of the acute temperature assimilative capacity. The highest 2-hour mean should be calculated from a minimum of 12 measurements spaced equally through the day.

Calculation of WQBELs

Using the mass-balance equation provided in the beginning of Section VI, the acute and chronic low flows set out in Section IV, ambient water quality as discussed in Section IV, and the in-stream standards shown in Section III, the WQBELs for were calculated. The data used and the resulting WQBELs, M_2, are set forth in:

Table A-7a for the chronic WQBELs and A-7b for the acute WQBELs for Tier 1 (0.73 MGD).
Table A-7c for the chronic WQBELs and A-7d for the acute WQBELs for Tier 2 (0.49 MGD).
Table A-7e for the chronic WQBELs and A-7f for the acute WQBELs for Tier 3 (0.35 MGD).

Chlorine: There are no point sources discharging total residual chlorine within one mile of the Town of Olathe WWTF. Because chlorine is rapidly oxidized, in-stream levels of residual chlorine are detected only for a short distance below a source. Ambient chlorine was therefore assumed to be zero.

***E. coli*:** For *E. coli*, the Division establishes the 7-day geometric mean limit as two times the 30-day geometric mean limit and also includes maximum limits of 2,000 colonies per 100 ml (30-day geometric mean) and 4,000 colonies per 100 ml (7-day geometric mean). This 2000 colony limitation also applies to discharges to ditches.

Temperature:
A WQBEL for temperature can only be calculated if there is representative data, in the proper form, to determine what the background Maximum Weekly Average Temperature and Daily Maximum ambient temperatures are. As this data is not available at this time, the temperature limitation will be set at the water quality standard and will be revisited in the future when representative temperature data becomes available.

Table A-7a
Chronic WQBELs for Design Flow of 0.73 MGD

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2
Temp MWAT (°C) March-Nov	2.6	1.1	3.7	NA	28	***27.5***
Temp MWAT (°C) Dec-Feb	2.6	1.1	3.7	NA	14	***13.8***
E. coli (#/100 ml) Dec - Feb	51	1.1	52.1	1	205	***9663***
E. coli (#/100 ml) March - Nov	2.6	1.1	3.7	1	205	***687***
TRC (mg/l) Dec - Feb	51	1.1	52.1	0	0.011	***0.52***
TRC (mg/l) March - Nov	2.6	1.1	3.7	0	0.011	***0.037***

Table A-7b

Acute WQBELs for Design Flow of 0.73 MGD

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2
Temp Daily Max (°C) March-Nov	2.1	1.1	3.2	NA	28.6	***28.6***
Temp Daily Max (°C) Dec-Feb	2.1	1.1	3.2	NA	14.3	***14.3***
TRC (mg/l) Dec - Feb	51	1.1	52.1	0	0.019	***0.9***
TRC (mg/l) March - Nov	2.1	1.1	3.2	0	0.019	***0.055***

Table A-7c

Chronic WQBELs for Design Flow of 0.49 MGD

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2
Temp MWAT (°C) March-Nov	2.6	0.76	3.36	NA	28	***27.5***
Temp MWAT (°C) Dec-Feb	2.6	0.76	3.36	NA	14	***13.8***
E. coli (#/100 ml) Dec - Feb	51	0.76	51.76	1	205	***13894***
E. coli (#/100 ml) March - Nov	2.6	0.76	3.36	1	205	***903***
TRC (mg/l) Dec - Feb	51	0.76	51.76	0	0.011	***0.75***
TRC (mg/l) March - Nov	2.6	0.76	3.36	0	0.011	***0.05***

Table A-7d

Acute WQBELs for Design Flow of 0.49 MGD

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2
Temp Daily Max (°C) March-Nov	2.1	0.76	2.86	NA	28.6	***28.6***
Temp Daily Max (°C) Dec-Feb	2.1	0.76	2.86	NA	14.3	***14.3***
TRC (mg/l) Dec - Feb	51	0.76	51.76	0	0.019	***1.3***
TRC (mg/l) March - Nov	2.1	0.76	2.86	0	0.019	***0.072***

Table A-7e

Chronic WQBELs for Design Flow of 0.35 MGD

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2
Temp MWAT (°C) March-Nov	2.6	0.54	3.14	NA	28	***27.5***
Temp MWAT (°C) Dec-Feb	2.6	0.54	3.14	NA	14	***13.8***
E. coli (#/100 ml) Dec - Feb	51	0.54	51.54	1	205	***19472***
E. coli (#/100 ml) March - Nov	2.6	0.54	3.14	1	205	***1187***
TRC (mg/l) Dec - Feb	51	0.54	51.54	0	0.011	***1.0***
TRC (mg/l) March - Nov	2.6	0.54	3.14	0	0.011	***0.064***

Table A-7f

Acute WQBELs for Design Flow of 0.35 MGD

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	M_3	M_2
Temp Daily Max (°C) March-Nov	2.1	0.54	2.64	NA	28.6	***28.6***
Temp Daily Max (°C) Dec-Feb	2.1	0.54	2.64	NA	14.3	***14.3***
TRC (mg/l) Dec - Feb	51	0.54	51.54	0	0.019	***1.8***
TRC (mg/l) March - Nov	2.1	0.54	2.64	0	0.019	***0.093***

Ammonia: The Ammonia Toxicity Model (AMMTOX) is a software program designed to project the downstream effects of ammonia and the ammonia assimilative capacities available to each discharger based on upstream water quality and effluent discharges. To develop data for the AMMTOX model, an in-stream water quality study should be conducted of the upstream receiving water conditions, particularly the pH and corresponding temperature, over a period of at least one year.

Temperature and corresponding pH data sets reflecting upstream ambient receiving water conditions were available for Uncompahgre River based on a study conducted by the Town of Olathe. The data, reflecting a period of record from January 2006 through December 2009, were used to establish the setpoint and average headwater conditions in the AMMTOX model. Effluent pH and temperature data were also available from the study and were used to establish the average facility contributions in the AMMTOX model.

Upstream ammonia data for each month were not adequate to represent monthly ambient water quality concentrations for the AMMTOX. Thus, the mean total ammonia concentration found in Uncompahgre River as summarized in Table A-6 was used as an applicable upstream ammonia concentration reflective of each month.

The AMMTOX may be calibrated for a number of variables in addition to the data discussed above. The values used for the other variables in the model are listed below:

- Stream velocity = $0.3Q^{0.4d}$
- Default ammonia loss rate = 6/day
- pH amplitude was assumed to be medium
- Default times for pH maximum, temperature maximum, and time of day of occurrence
- pH rebound was set at the default value of 0.2 su per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile.

The results of the ammonia analyses for the Town of Olathe WWTF are presented in Tables A-8a, A-8b and A-8c.

Table A-8a

AMMTOX Results for Uncompahgre River at the Town of Olathe WWTF

Design of 0.73 MGD (1.1 cfs)

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	155*	155
February	86*	86
March	7.4	7.8
April	6.3	10
May	7	15
June	8.2	18
July	6.5	14
August	6.2	14
September	8.2	14
October	10	15
November	17	20
December	190*	190

*The acute WQBEL is protective of the chronic WQBEL. Therefore, limitations will be set based on the acute WQBEL.

Table A-8b

AMMTOX Results for Uncompahgre River at the Town of Olathe WWTF

Design of 0.49 MGD (0.76 cfs)

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	223*	223
February	122*	122
March	9.7	10
April	8.2	13
May	9.4	20
June	11	25
July	8.8	19
August	8.3	19
September	11	19
October	13	19
November	21	24
December	285*	285

*The acute WQBEL is protective of the chronic WQBEL. Therefore, limitations will be set based on the acute WQBEL.

Table A-8c

AMMTOX Results for Uncompahgre River at the Town of Olathe WWTF

Design of 0.35 MGD (0.54 cfs)

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	312*	312
February	172*	172
March	12	13
April	10	17
May	12	27
June	14	33
July	11	26
August	11	25
September	15	24
October	18	25
November	26	30
December	400*	400

*The acute WQBEL is protective of the chronic WQBEL. Therefore, limitations will be set based on the acute WQBEL.

VII. Antidegradation Evaluation

As set out in *The Basic Standards and Methodologies for Surface Water*, Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as "Use Protected." Note that "Use Protected" waters are waters "that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process" as set out in Section 31.8(2)(b). The antidegradation section of the regulation became effective in December 2000, and therefore antidegradation considerations are applicable to this WQA analysis.

According to the *Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins*, stream segment COGUUN04b is Use Protected. Because the receiving waters are designated as Use Protected, no antidegradation review is necessary in accordance with the regulations. Thus, for the purpose of this WQA analysis, antidegradation review requirements have been met and no further antidegradation evaluation is necessary.

VIII. Technology Based Limitations

Federal Effluent Limitation Guidelines

The Federal Effluent Limitation Guidelines for domestic wastewater treatment facilities are the secondary treatment standards. These standards have been adopted into, and are applied out of, Regulation 62, the Regulations for Effluent Limitations.

Regulations for Effluent Limitations

Regulation No. 62, the Regulations for Effluent Limitations, includes effluent limitations that apply to all discharges of wastewater to State waters, with the exception of storm water and agricultural return flows. These regulations are applicable to the discharge from the proposed discharge.

Table A-9 contains a summary of the applicable limitations for pollutants of concern at this facility.

Table A-9

Regulation 62 Based Limitations

Parameter	***30-Day Average***	***7-Day Average***	***Instantaneous Maximum***
BOD_5	30 mg/l	45 mg/l	NA
BOD_5 Percent Removal	85%	NA	NA
TSS, aerated lagoon	75 mg/l	110 mg/l	NA
Total Residual Chlorine	NA	NA	0.5 mg/l
pH	NA	NA	6.0-9.0 s.u.
Oil and Grease	NA	NA	10 mg/l

IX. References

Regulations:

The Basic Standards and Methodologies for Surface Water, Regulation 31, Colorado Department Public Health and Environment, Water Quality Control Commission, effective January 31, 2013.

Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins, Regulation No. 35, Colorado Department Public Health and Environment, Water Quality Control Commission, effective March 30, 2013.

Regulations for Effluent Limitations, Regulation 62, CDPHE, WQCC, March 30, 2008.

Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List, Regulation 93, Colorado Department Public Health and Environment, Water Quality Control Commission, effective April 30, 2010.

Policy and Guidance Documents:

Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, December 2001.

Memorandum Re: First Update to (Antidegradation) Guidance Version 1.0, Colorado Department Public Health and Environment, Water Quality Control Division, April 23, 2002.

Rationale for Classifications, Standards and Designations of Segments of the Gunnison River, Colorado Department Public Health and Environment, Water Quality Control Division, effective March 30, 2013.

Policy Concerning Escherichia coli versus Fecal Coliform, CDPHE, WQCD, July 20, 2005.

Colorado Mixing Zone Implementation Guidance, Colorado Department Public Health and Environment, Water Quality Control Division, effective April 2002.

Policy for Conducting Assessments for Implementation of Temperature Standards in Discharge Permits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-23, effective July 3, 2008.

Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-24, effective March 10, 2008.

Policy for Characterizing Ambient Water Quality for Use in Determining Water Quality Standards Based Effluent Limits, Colorado Department Public Health and Environment, Water Quality Control Division Policy Number WQP-19, effective May 2002.